IPWG recent accomplishments and future directions

Kazumasa Aonashi
Meteorological Research Institute
Japan Meteorological Agency
Tsukuba, Japan

Nai-Yu Wang
Earth System Science Interdisciplinary Center
University of Maryland
College Park, Maryland, U.S.A

Outline

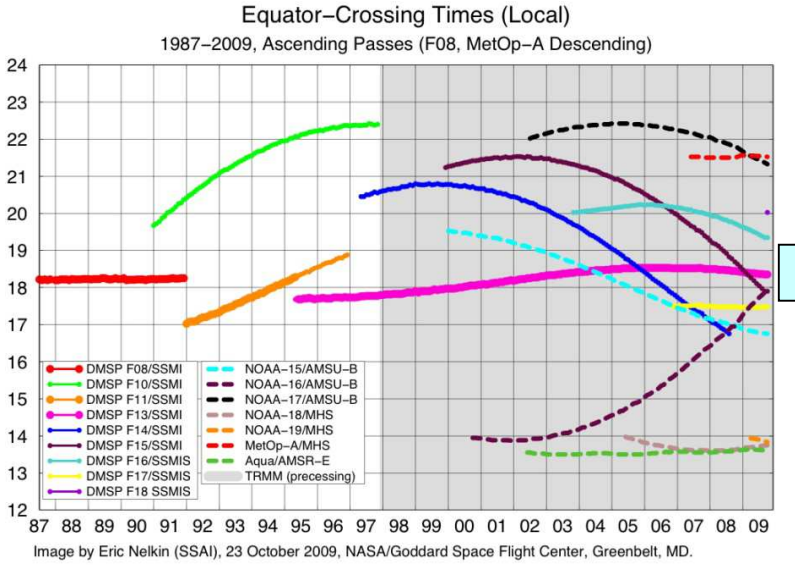
- IPWG Objectives
- Recent Accomplishments
- IPWG-7 Workshop and Future Activities
- Recommendations to CGMS

IPWG Objectives

IPWG was established under Coordinating Group on Meteorological Satellites (CGMS) to:

- Promote standard operational procedures and common software for deriving precipitation estimates from satellites
- Establish standards for validation and independent verification of precipitation estimates
- Foster the exchange of data on inter-comparisons of operational precipitation estimates from satellites
- Stimulate increased international scientific research and development in this field
- Provide recommendations to national and international agencies regarding the utilization of current and future satellite instruments on both polar and geostationary platforms
- Encourage regular education and training activities.

We want to get better at turning this



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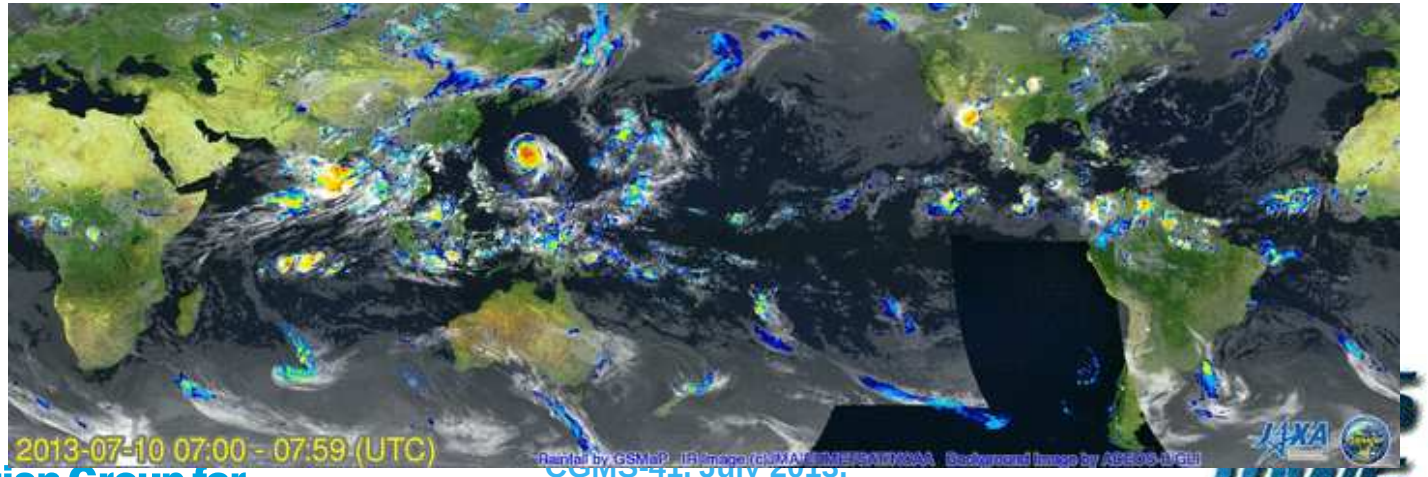

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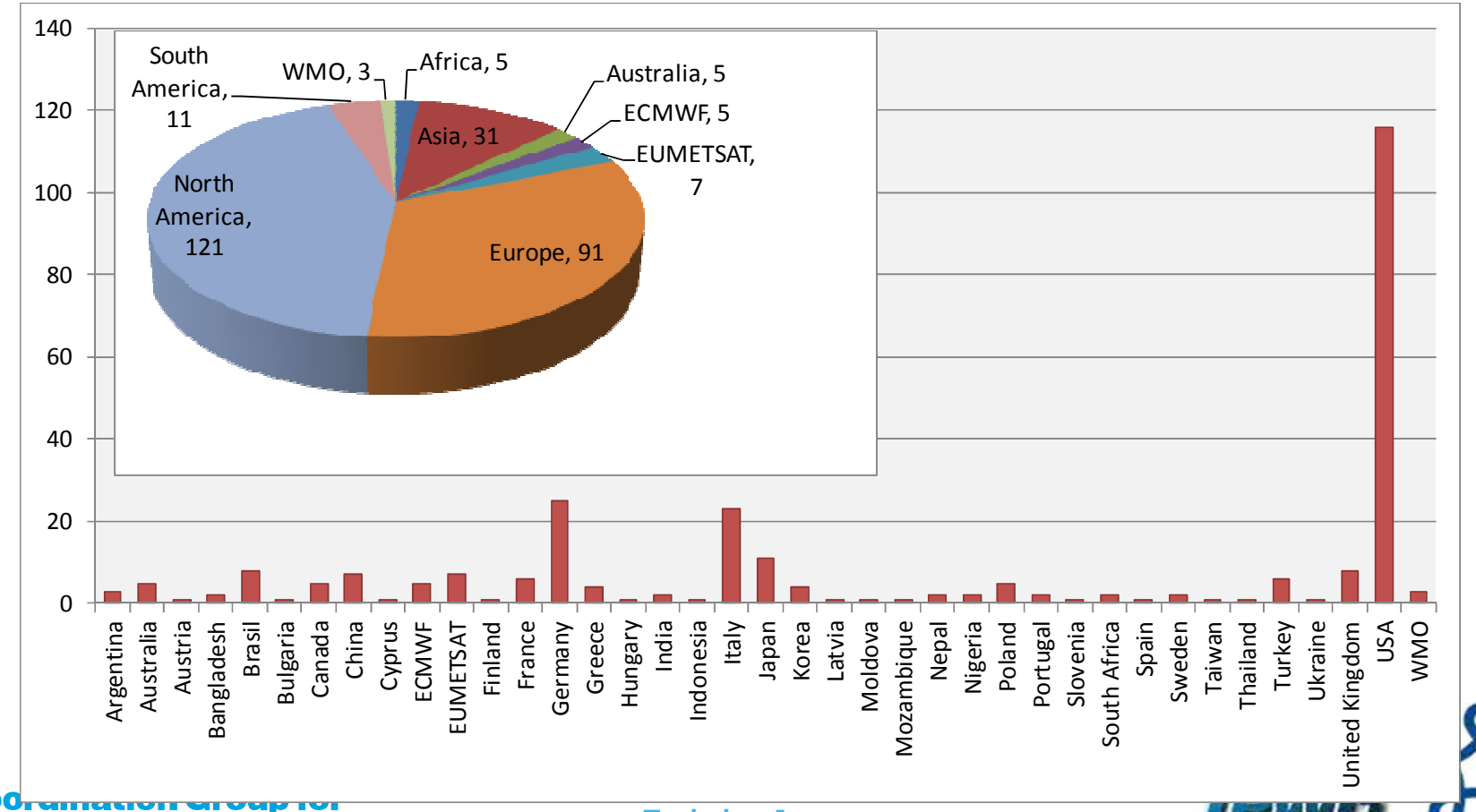
IPWG Membership

- There are about 279 participants from 39 countries and agencies
- Every year new members are joining IPWG.



IPWG accomplishments

- Conducting the survey on applications of satellite-derived precipitation products and publishing the list of adequate datasets;
- Survey of different sources of validation rainfall data, according to Recommendation No 3 from IPWG-5 Validation Working Group Meeting;
- Publishing at the IPWG web page the lists of publicly available, quasi-operational and quasi-global precipitation data sets;
- Leadership of Group on Earth Observations (GEO) precipitation subtask;
- Interactions with Working Group on Numerical Experimentation (WGNE) on satellite precipitation validation using NWP generated precipitation estimates;

- Hosted and sponsored by CPTEC/INPE, Brasil.
- 55 Participants from 14 countries (Argentina, Boliva, Brazil, China, France, Germany, Italy, Japan, Poland, South Africa, South Korea, Switzerland, United Kingdom, United States).
- Five oral sessions (42 presentations).
- Two poster sessions (23 posters).
- Three Working Groups sessions (Research&New Technologies, Validation, Aplication).
- Special session on Megha-Tropiques.
- Discussion about the future of IPWG and next activities.

IPWG 6 Training event

NOAA Training on “New and Emerging Technologies, Sensors, and Datasets for Precipitation”, 15-17 October 2012.

- 15 participants from 10 countries (Argentina, Brazil, Columbia, Guatemala, Costa Rica, Peru, Poland, Nigeria, Uraguay, United States).
- Lectures on:
  - New and Upcoming Satellite Sensors;
  - New and Existing Precipitation Products;
  - Satellite Precipitation Product Applications and Applications for Improved NWP Predictive Capabilities;
  - New and Existing Validation/Verification Techniques;
  - Regional Focus: Precipitation in South America.

IPWG recent accomplishments

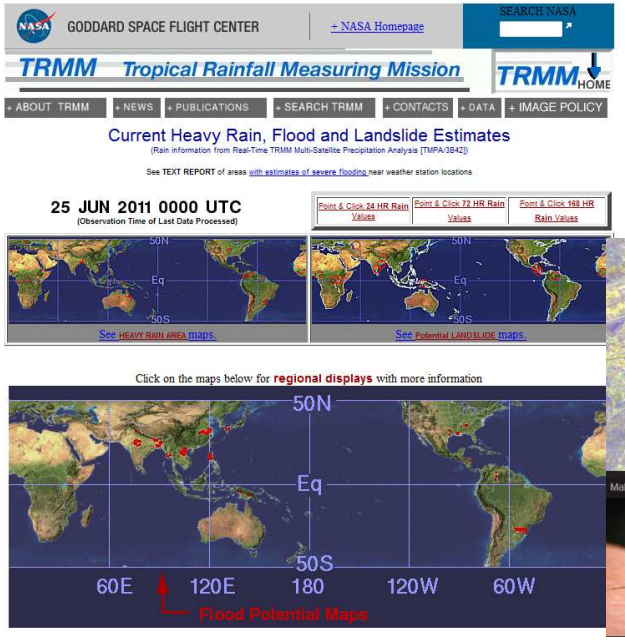
- Promoting IPWG, expanding membership and updating the membership database;
- IPWG focused publications:
  - IPWG-5 summary in the AMS Bulletin (Huffman, G.J., and C. Klepp, 2011: Meeting Summary: Fifth Workshop of the International Precipitation Working Group. Bull. Amer. Meteor. Soc., doi: 10.1175/BAMS-D-11-00030.1);
  - IPWG-5 Proceedings (Klepp, C. and G. J. Huffman, 2011: 5th International Precipitation Working Group Proceeding, Hamburg, Germany, 15 October 2010, Hamburg, Germany, Berichte zur Erdsystemforschung, 100, 2011);
  - paper on highlighting the variety of applications using satellite precipitation products (Kucera, P. A., et al., 2012: Precipitation from Space: Advancing Earth System Science. Bull. Amer. Meteor. Soc., doi:10.1175/BAMS-D-11-001175)
  - IPWG-6 Proceedings under preparation;
- Representation at 10 meetings.

Applications of Satellite-derived Precipitation Datasets

- Valuable input from the IPWG community (ongoing process)
- A BAMS publication that summarizes the wide-range of applications
  - Kucera, P. A., E. E. Ebert, F. J. Turk, V. Levizzani, D. Kirschbaum, F. J. Tapiador, P. Xian, A. Loew, and M. Borsche, 2013: Precipitation from Space: Advancing Earth System Science. *Bull. Amer. Meteor. Soc.* doi:10.1175/BAMS-D-11-001175)

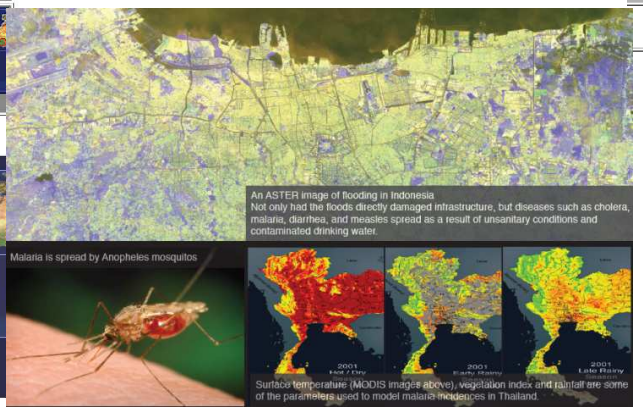
Floods/Landslides

http://trmm.gsfc.nasa.gov/publications_dir/potential_flood_hydro.html



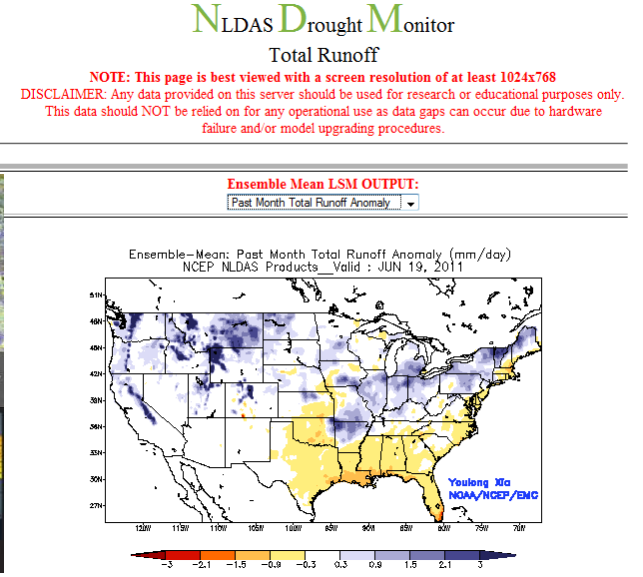
Disease Monitoring

http://appliedsciences.nasa.gov/pdf/Project1P/08-Malaria.pdf



Drought Monitoring

http://www.emc.ncep.noaa.gov/mmb/nldas/drought/



IPWG recent accomplishments

- a new and improved "datasets" page in the IPWG website that organizes precipitation information according to their sources (single source, merged satellite data, combination of satellite and gauges, etc). These new tables are designed to guide the users directly to the precipitation data they are looking for:
  http://www.isac.cnr.it/~ipwg/data/datasets.html
  (Thanks to George Huffman and Vincenzo Levizzani)

- the South African Weather Service joined the coordinated IPWG validation effort.

- There is also a new AMMA-catch gauge data added to the ground validation data source to:

  http://www.isac.cnr.it/~ipwg/validation-links.html.

Global Precipitation Dataset Resources

- Combination datasets with gauge data
- Satellite combination datasets
- Single source datasets
- Precipitation gauge analyses

Example Table: Combination datasets w/ Gauge Data

Algorithm	Input data	Space/time scales	Areal coverage/start date	Update frequency	Latency	Producer (Developer) URL
CAMS/OPI	CMAP-OPI, gauge	2.5° /monthly	Global/1979	Monthly	5 days	NOAA/NWS CPC (Xie)[1]
CMAP	OPI, SSM/I, SSMIS, GPI, MSU, gauge, model	2.5° /monthly	Global/1979 – Oct 2010	Seasonal	3 months	NOAA/NWS CPC (Xie)[2]
	OPI, SSM/I, GPI, MSU, gauge, model	2.5° /pentad	Global/1979 – Sept. 2009	Seasonal	3 months	NOAA/NWS CPC (Xie)[3]
	OPI, SSM/I, GPI, gauge	2.5° /pentad-RT	Global/2000	Pentad	1 day	NOAA/NWS CPC (Xie)[4]
CMORPH V1.0 BIAS-CORRECTED	TMI, AMSR-E, SSMI, SSMIS, AMSU, MHS, IR vectors, CPC Gauge, GPCP Pentad	0.25° /3-hourly	50° N-S/1998	Daily	18 hours	NOAA/CPC (Xie) [5]
CMORPH V1.0 BLENDED	TMI, AMSR-E, SSMI, SSMIS, AMSU, MHS, IR vectors, daily gauge	0.25° /3-hourly	50° N-S regional/1998	Daily	18 hours	NOAA/CPC (Xie) [5]
GPCP One-Degree Daily (Version 1.2)	SSMI- & SSMIS-TMPI (IR), TOVS, AIRS, GPCP monthly	1° /daily	Global – 50° N-50° S/Oct. 1997 – July 2011	Monthly	3 months	NASA/GSFC 612 (Huffman)[6]
GPCP pentad (Version 1.1)	OPI, SSM/I, GPI, MSU, gauge, GPCP monthly	2.5° /5-day	Global/1979 – 2008	Seasonal	3 months	NOAA/NWS CPC (Xie)[7]
GPCP Version 2.2 Satellite-Gauge (SG)	GPCP-OPI, gauge 1/79-7/87, 12/87, thereafter SSMI- & SSMIS-AGPI (IR), gauge, TOVS, AIRS	2.5° /monthly	Global/1979 – 2010	Monthly	2 months	NASA/GSFC 612 (Huffman, Adler)[8]
PERSIANN-CDR	GRIDSAT-IRWIN, GPCP Monthly Precipitation	0.25° /daily	60° N-S/1980	Monthly	2 months	UC Irvine (Hsu)[9]
TRMM Plus Other Data (3B43 Version 7)	TCI, TMI, SSMI, SSMIS, AMSR-E, AMSU, MHS, MW-VAR (IR), gauge	0.25° /monthly	Global – 50° N-S/Jan 1998	Monthly	2 months	NASA/GSFC PPS (Huffman, Adler) [10]
TRMM Plus Other Satellites (3B42 Version 7)	TCI, TMI, SSMI, SSMIS, AMSR-E, AMSU, MHS, MW-VAR (IR), gauge	0.25° /3-hourly	Global – 50° N-S/Jan 1998	Monthly	2 months	NASA/GSFC PPS (Huffman, Adler) [10]
RFE	GPI, NOAA SSM/I, gauge	10 km/daily	Africa/Oct. 2000	Daily	6 hours	NOAA/NWS CPC (Xie)[11]
		10 km/daily	South Asia/April 2001	Daily	6 hours	NOAA/NWS CPC (Xie)[12]

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IPWG recent accomplishments

- IPWG supported the

- Nai-Yu Wang (IPWG Co-Chair) gave an IPWG update presentation to the Fourth International Workshop on Space-based Snowfall Measurement (4th IWSSM) in May and co-chaired the Working Group on Global and Regional Detection and Estimation.
- JAXA will host IPWG-7 workshop (Oct. 2014, Tsukuba)

7th International Precipitation Working Group Workshop

21-25 October 2014

Tsukuba, Japan

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Japan Aerospace Exploration Agency

IPWG future activities

- To continue and expand validation activites:
  - Foster improved availability of validation data from data sparse regions: Africa;
  - Prepare guidance document for precipitation validation techniques and issues;
  - Encourage validation of precipitation datasets in hydrological models;
  - Collect datasets for snow validation.
- To continue with training activities and establish the training devoted section at the IPWG web site.
- To establish an ad-hoc Area-Average Special Interest Group to share information, processing concepts, and best practices on shapefile-averages for countries, other political subdivisions, stream basins, as well as to work toward providing data products in GIS-standard format.

IPWG 6 CGMS Recommendations

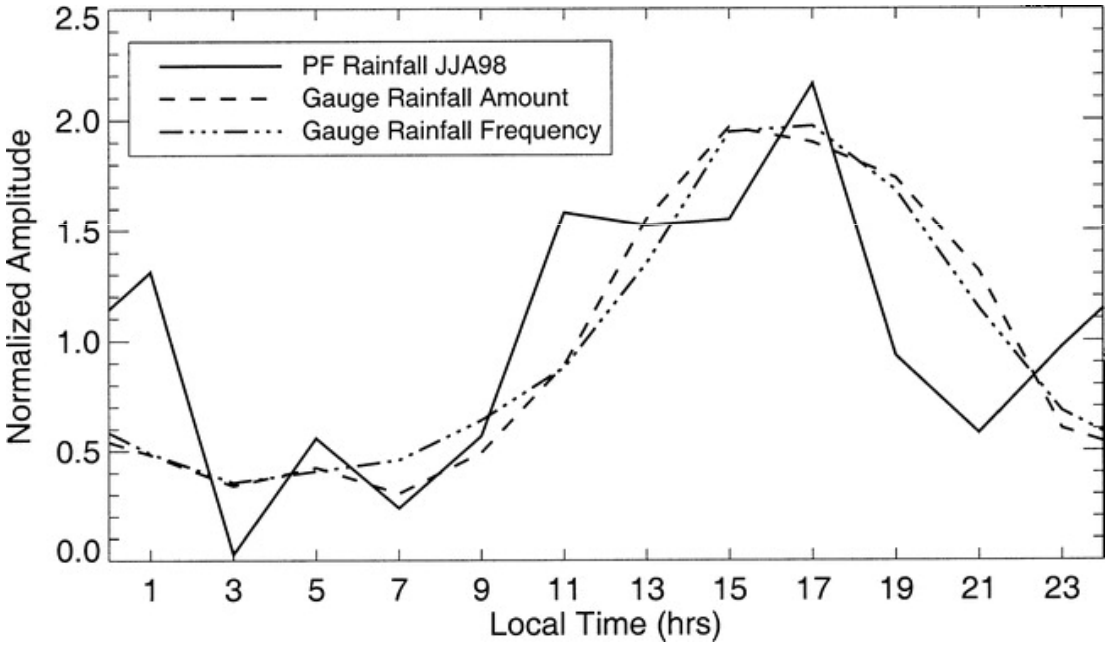
- For products derived by operational and quasi-operational satellite algorithms based on multiple platforms and channels (VIS, IR, WV), CGMS members should set up the necessary archives of historical data together with the relevant algorithm versions. Those should be kept for a minimum of two years to facilitate intercomparisons and enable graceful transitions to the new algorithms.
- The archive infrastructure should enable routine access to and assembly of channels from GEO and LEO satellites to provide consistent generation of multi- channel satellite records supporting a range of precipitation-related applications.
- The infrastructure should also allow an efficient reprocessing of products for climate data record generation.

IPWG 6 CGMS Recommendations

- IPWG recommend to CGMS to ensure the long-term continuity of conically-scanning microwave imagers, as well as space based radars, consistent with the CGMS baseline and the WMO Vision for the Global Observing System in 2025.
- Furthermore, the coordination of satellite overpass times has to be ensured including non sun- synchronous platforms with a minimum temporal resolution of 3 h.
- CGMS members and WMO should provide adequate support to ensure active participation at international meetings and training events.
- To ensure the optimum use of satellite-based precipitation products more training is necessary. Satellite agencies are invited to cooperate in this endeavor with IPWG experts and the WMO/CGMS VLab.

Why we need 3 hour sampling of conical-scanning MWI (1/2)

The 3-hour requirement to provide an adequate resolution of the diurnal cycle of precipitation.



The diurnal cycle of TRMM PF rainfall (solid), CDC gauge rainfall (dash), and rain frequency (dash–dot) over the southeast United States, normalized to the daily mean amplitude

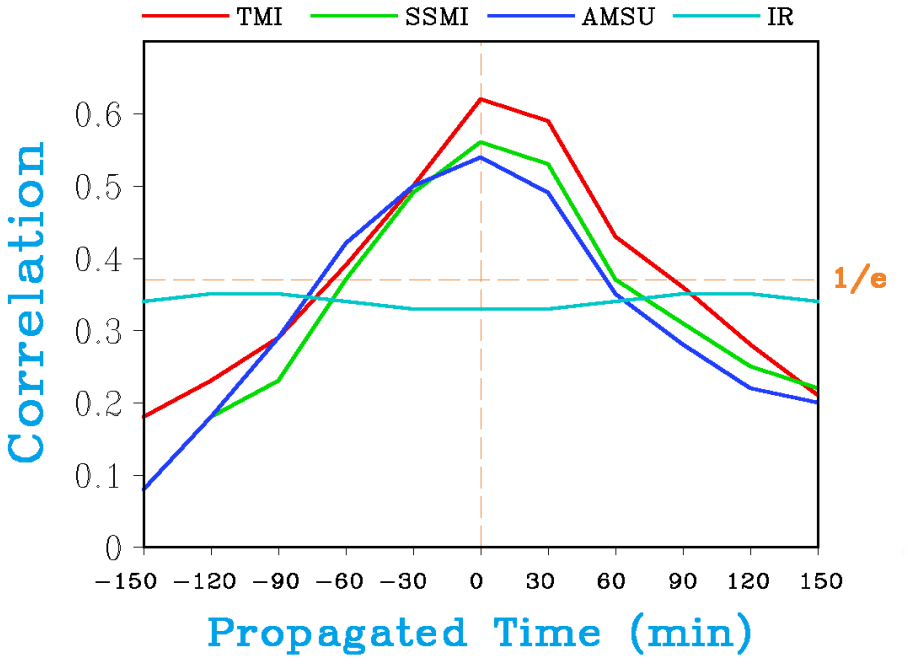
Why we need 3 hour sampling of conical-scanning MWI (2/2)

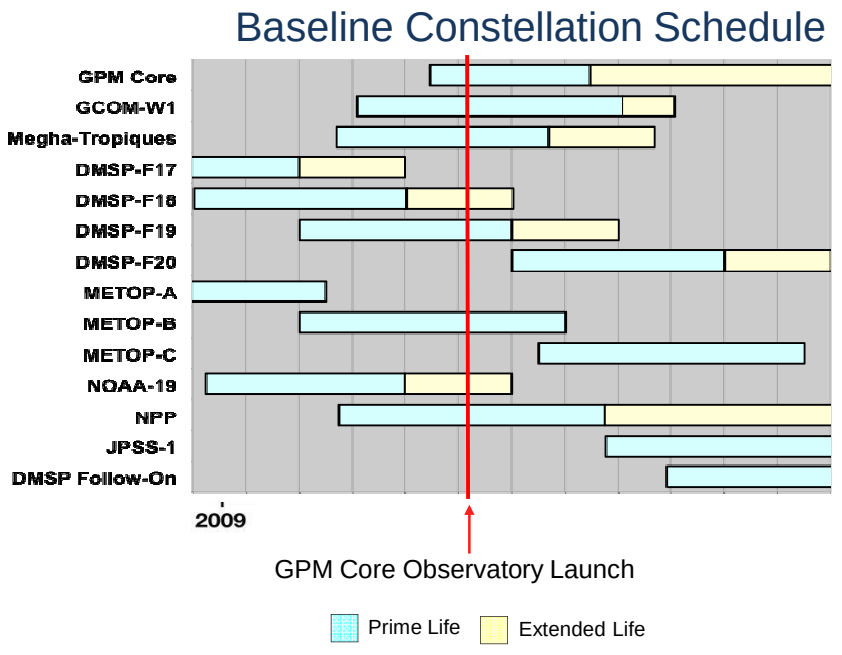
To fill the temporal gaps, we developed morphing techniques using Geo IR data.

But, the precipitation retrievals lose their quality by +- 90 minutes from the MWI observation time.

NWP models require accurate precip estimation on short time.

Note:
High-resolution conical-scanning MWI (TMI) gives retrievals that have the highest correlation with precipitation observation.





- Ageing instruments of TRMM (TMI)
- Difficulties reported by IPWG members in accessing MWRI data from FY-3 and MWI data on HY-2
- Dysfunctional data stream from MADRAS on Megha-Tropiques.
- AMSR2+ flying on GCOM-W1-3 through 2025?

Whether will the future constellation of MW sensors on LEO (MW imagers in particular) provide sufficient temporal sampling to derive precipitation estimates?

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